COMMONWEALTH OF PENNSYLVANIA.

DEPARTMENT OF AGRICULTURE.

BULLETIN NO. 76.

A CO-OPERATIVE INVESTIGATION
INTO
THE AGRICULTURAL SEED SUPPLY OF PENNSYLVANIA,

CONDUCTED BY

PROF. GEORGE C. BUTZ.

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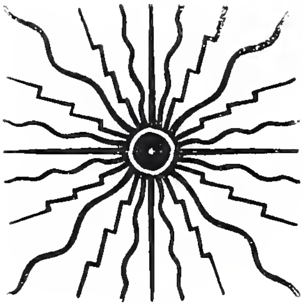
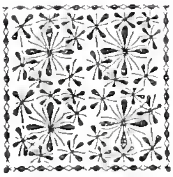


PREFACE.

Harrisburg, Pa., April 1, 1901.

The following Bulletin, No. 76, by Prof. George C. Butz, Horticulturist of the Pennsylvania State College, Agricultural Experiment Station, upon "THE AGRICULTURAL SEED SUPPLY OF PENNSYLVANIA," is the result of a co-operative investigation into the vitality of seeds as found in the seed stores and markets of this State. The Department of Agriculture and the State Experiment Station began this work about one year ago. The tests of seeds were made at the Station, and the results explain the frequent failures of farmers and gardeners to secure a "stand." Much of the seed is of such a low percentage of vitality as to be almost worthless.

JOHN HAMILTON,
Secretary of Agriculture.



THE

AGRICULTURAL SEED SUPPLY OF PENNSYLVANIA.

A CO-OPERATIVE INVESTIGATION BY THE PENNSYLVANIA STATE DEPARTMENT OF AGRICULTURE AND THE PENNSYLVANIA STATE COLLEGE AGRICULTURAL EXPERIMENT STATION.

BY GEO. C. BUTZ.

The low prices of farm products and the considerable competition of western farmers are forcing the eastern farmer to look closely to his methods, and to mend his ways, in order that he may economize in expenses and increase his yields and that his profits may continue to encourage his honest labors. Far from insignificant is the fact that in the purchase of farm seeds, he is often paying dearly for lifeless seeds, weed seeds and even sand and other dirt that can contribute nothing to the farm but a poor grade of fertilizer.

In view of the importance of the subject and of our lack of knowledge of the quality of the agricultural seeds in the markets of Pennsylvania, the following investigation into the conditions of the seed markets of the State has been conducted in co-operation by the State Department of Agriculture and the Experiment Station.

Similar investigations by the United States Department of Agriculture and the Experiment Stations have shown that no complaint can be made against the established seed houses where every care is exercised to have seeds *pure*, *viable*, and *true to name*, but there are many careless and unscrupulous dealers handling untested seeds, in the purchase of which the farmer unwittingly pays an enormous price and then at harvest time he wonders why the Lord gave him weeds instead of clover.

Perhaps the seed merchant is not wholly to blame for the fraud perpetrated, since it is very likely he himself is not aware of the inferior character of the seeds he is selling, and at present the annoyance lies wholly with the farmer. Before purchasing, he must test the seed or have it tested by a reliable authority, or, he may require a guarantee of the standard of purity and germination and have the seed tested later. He should be willing to pay what good seed is worth and beware of *very cheap* seeds. In some States, legislation has been enacted to prevent gross fraud in the sale of seeds, but as yet no State has attempted a system of seed control upon the basis of the fertilizer control so effectual in this State. In 1897, the Legislature of the State of Maine enacted a law entitled "An act to regulate the sale of agricultural seeds." This act makes it the duty of the Director of the Experiment Station to prescribe the methods to be used in examining seeds, and to "publish equitable standards of purity together with such other information concerning agricultural seeds as may be of public benefit." There is no attempt here at seed inspection and hence the effect of the law in the way of *regulating* the sale of seeds is very slight.

COLLECTING THE SAMPLES.

To fairly test the seed supply of Pennsylvania, it was proposed to secure samples of the chief agricultural seeds directly from the merchants where the farmers are accustomed to buy their supply; and, accordingly, the Secretary of Agriculture authorized a reliable agent in every county of the State to take fair average samples of the following kinds of seeds and in the quantities indicated:

Kentucky blue grass, ...	½ oz.
Timothy, ...	½ oz.
Orchard grass, ...	½ oz.
Red clover, medium, ...	1 oz.
Red clover, mammoth, ...	1 oz.
Crimson clover, ...	1 oz.
Alsike clover, ...	1 oz.
Onion, Yellow Globe Danvers, ...	½ oz.
Cauliflower, Dwarf Erfurt, ...	¼ oz.
Sweet corn, Stowell's Evergreen, ...	½ pint.

Each quantity was placed in an envelope provided for the purpose, properly labeled and sealed by the agent and forwarded to the Experiment Station at State College, Pa.

The agents selected for this purpose were members of the State Board of Agriculture and certain other agriculturists who have been in close touch with the Department of Agriculture. There were collected in this manner 243 samples of seeds from 12 counties of the State, distributed as follows:

County.	Collector	Address.	Number of Samples.
Allegheny,	J. R. Orr,	Pittsburg,	36
Berks,	H. G. McGowan,	Geiger's Mills,	50
Bucks,	G. W. Row,		17
Cambria,	J. J. Thomas,	Carrolltown,	14
Cumberland,	D. B. Biggs,	Shippensburg,	8
Dauphin,	S. F. Barber,	Harrisburg,	18
Erie,	A. L. Wales,	Corry,	21
Fayette,	J. M. Hantz,	Merrittstown,	11
Lackawanna,	H. W. Northup,	Glenburn,	22
Northampton,	Wm. F. Beck,	Nazareth,	12
Venango,	W. J. Magee,	Oil City,	6
Warren,	R. J. Weld,	Sugar Grove,	25

These samples represent 57 different merchants in 23 different towns, and, so far as is known, the seeds were grown in one of the following States: Pennsylvania, New York, Ohio, Maryland, Indiana, Illinois, Michigan or California.

It will be seen in the tables that follow that with the seeds requested came some samples of white clover, alfalfa and millets.

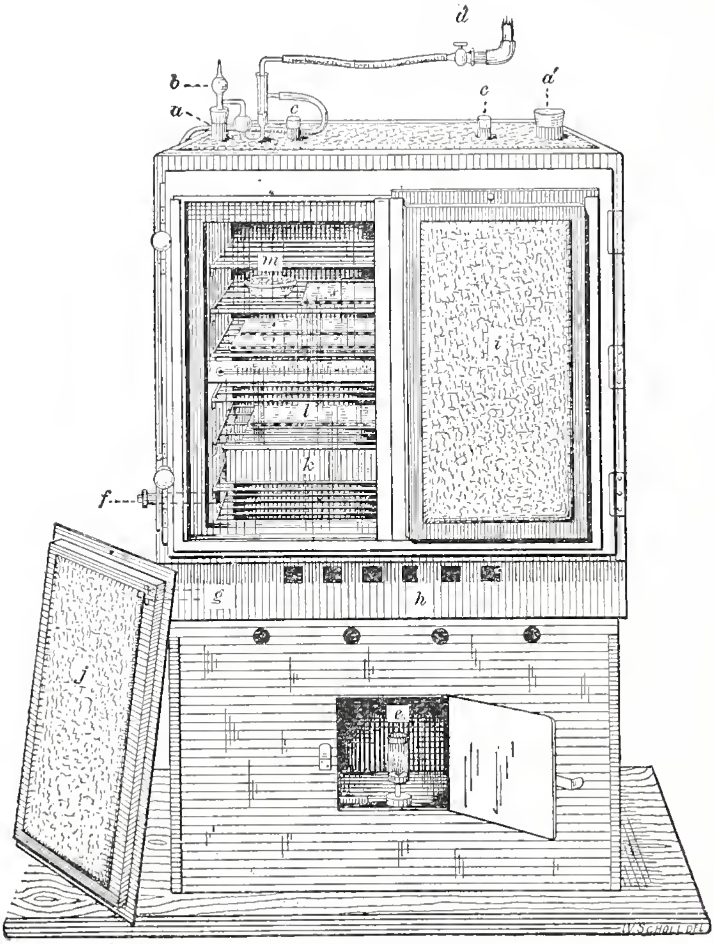
THE METHOD OF CONDUCTING THE TESTS.

The work of testing the samples of seeds was performed according to the rules adopted by the Committee of the Association of American Agricultural Colleges and Experiment Stations, January 23, 1897. Every sample was taken by the authorized agent of the Department of Agriculture and sent in packages provided for the purpose, directly to the Experiment Station. Each package bore the name of the seed, its reputed age and selling price, also the name of the merchant, and the name of the agent taking the sample.

The weights of the samples were in every case greatly above the minimum quantities stipulated in the above rules for making purity tests. Foreign seeds were taken from the entire sample by spreading the seeds over white paper, and picking out the weed seeds with the use of forceps and a magnifying glass.

For the germination tests 200 seeds of each sample were taken indiscriminately from the pure seed, and duplicate tests were made simultaneously. In the case of the corn, but 100 seeds were used in accordance with the aforesaid rules.

The germinating apparatus used for this work is the standard seed germinating chamber used by the United States Department of Agriculture and the American Experiment Stations, in which the conditions of moisture and temperature can be most perfectly controlled. The sub-stratum or seed bed was a blue blotting paper which was kept well moistened during the germination tests; the temperature was maintained almost uniformly at 70 degrees, F.



STANDARD GERMINATOR.
By courtesy of U. S. Dept. of Agriculture.

Records were made of the germinations every day except Sabbath days and every sample was permitted to remain in the germinator fourteen days.

The Kentucky blue grass seed was germinated in seed pans of sand in the greenhouse, giving the seed the lightest possible covering of sand that was previously washed and passed through a sieve of small mesh. The duration of these tests was 30 days. All seeds that fell short of the standards were tested a second time and the larger results only are reported.

At the head of the tables in this report are given the standard percentages of purity and germination fixed by the United States Department of Agriculture after many thousand tests had been made. Several reputable seed houses have been willing to guarantee such percentages in the seeds they sell, and it may be seen from the results given in the following tables that they are not too exacting of the seedsmen and not more expensive for the farmer.

The net value or agricultural value of a sample to a farmer is indicated in the tables in the column headed the "per cent. of pure, germinable seed," and is obtained in each case from the figures of "per cent. purity" and "per cent. total germination," by multiplying the former by the latter figure and dividing by 100. In other words, if 98 per cent. of a sample is pure seed and of this only 90 per cent. germinates, then there is in the sample only 90 per cent. of 98 per cent., or 88.2 per cent. of pure germinable seed. If our sample is red clover seed costing $6.00 per bushel, we are paying for a bushel of pure germinable seed $6×100÷88.2=$6.80. It is clear, therefore, that if the purity or germination runs low, the cost of the good seed in the sample mounts very high.

RED CLOVER.

Thirty-three samples of Medium Red Clover were examined. Of these, only three fell below the standard of purity and five below the standard of germination. In one case (No. 241), the purity was high but the germination only 22.8 per cent. This was undoubtedly old seed; the bright, fresh color of new seed was wanting. The germination test was repeated in soil in the greenhouse with but one per cent. of germination after many days. The purchase of such seed, therefore, at best would cost the farmer $22.12 per bushel of good seed, and this according to the soil test would give, under average conditions, exceedingly poor results. The market price is no indication of the true value of the seed. The prices ranged from $4.75 to $6.60 per bushel and the cost of the pure seed ranged from $5.23 to $22.12 (or $8.68, by dropping the one sample of undoubtedly old seed). While we should beware of cheap seed, it is remarkable that sample No. 238, with the lowest selling price ($4.75), is in fact the cheapest in cost of good seed, $5.23.

The impurities were usually weed seeds, consisting mainly of Green Foxtail Grass, Lady's Thumb, Ribgrass and Docks. The Clover seed is remarkably free from mechanical impurities.

RED CLOVER.

Character and Cost of the Seeds on the Market. Standard of Purity, 98 Per cent. Standard of Germination, 85-90.

Number of Sample.	Per cent. pure seed.	Per cent. germination in five days.	Total per cent. germination in fourteen days.	Per cent. of pure germinable seed.	Selling price per bushel.	Number of foreign seeds in one pound of sample.	Cost of pure germinable seed per bushel.
4,	99.8	87.8	91.5	91.3	$5 00	1,250	$5 48
5,	99.8	85	89.7	89.5	5 80	429	6 48
19,	99.2	86.8	90	89.3	5 50	210	6 16
24,	99.0	86.8	91.5	90.6	6 00	2,668	6 62
34,	99.5	91.8	94	93.5	6 50	728	6 95
38,	98.2	87.8	92.3	90.6	5 75	6,666	6 35
45,	99.8	88.5	91.3	91.1	6 00	68	6 59
50,	99.1	72.5	74.8	74.1	6 25	2,533	8 43
55,	97.8	88	91.3	89.3	6 00	7,238	6 76
58,	99.5	72	75.3	74.9	6 50	1,225	8 68
70,	96.8	69.3	71.8	69.5	5 25	4,385	7 55
76,	99.2	85.8	90.3	89.6	5 25	2,842	5 86
92,	100	81.8	84.8	84.8	5 75	49	6 78
102,	100	90.5	94.3	94.3	6 60	15	7 00
105,	97.8	90	93	91.0	6 00	3,640	6 59
119,	99.9	85.3	90.3	90.2	5 75	264	6 37
121,	98.2	85.5	88.8	87.2	5 40	2,357	6 19
138,	98.0	83	88.3	86.5	5 50	6,006	6 36
150,	99.8	87.5	89.5	89.3	5 60	266	6 27
152,	100	83.3	88.8	88.8	5 75	23	6 59
159,	99.9	87.8	91.5	91.4	5 50	312	6 02
166,	99.1	76.3	78.5	77.8	6 00	817	7 71
175,	99.5	89	90	89.6	5 50	1,563	6 14
179,	99.6	91.5	93.8	93.4	5 50	192	5 89
186,	99.5	82.8	85.5	85.1	5 50	882	6 46
206,	99.9	87.5	90.3	90.2	5 00	256	5 54
207,	99.5	82.8	87.3	86.9	5 10	1,404	5 87
223,	99.7	94.3	96.8	96.5	6 00	1,053	6 22
225,	99.5	74.5	82	81.6	5 75	1,301	7 05
238,	100	88.8	90.8	90.8	4 75	130	5 23
239,	99.9	84.8	89.5	89.4	5 50	270	6 15
241,	99.1	20.3	22.8	22.6	5 00	2,376	22 12
243,	99.8	86.8	90.3	90.1	5 75	215	6 38

RED CLOVER.

Number and Character of Foreign Seeds in a Pound of Each Sample.

Number of Sample.	4.	5.	19.	24.	34.	38.	45.	50.	55.	59.	70.	76.	92.	102.	105.	119.	131.
Green Foxtail,	1,250						17		704		975			15	560	192	115
Yellow Foxtail,					42		16										
Lady's Thumb,			120	134			35	68	104	35	156		12		40		598
Rugel's Plantain,			90														
Ribgrass,		420		17	630			2,380	88	1,167	1,092	2,800	12		440	48	1.150
Pursh's Plantain,					56			17			916						
Sheep Sorrel,									1,056		936				440		46
Curled Dock,																	
Willow-leaved Dock,						66		68	352	23	312	42	25		200		
Tumble-weed,				17					836						360		46
Heal-all,						6,600											
Meadow Fescue,				2,500													
Finger Grass,															160		34
Witch Grass,															960	12	92
Spotted Spurge,																12	
Ragweed,																	276
Lamb's Quarters,																	
Wild Peppergrass,																	
Barnyard Grass,																	
Timothy,									4,048						480		
Total Foreign Seeds in One Pound,	1,250	420	210	2,668	728	6,666	68	2,033	7,238	1,225	4,385	2,842	49	15	3,640	264	2,357

RED CLOVER.

Number and Character of Foreign Seeds in a Pound of Each Sample—Continued.

Number of Sample.	133.	150.	152.	159.	166.	175.	179.	186.	206.	207.	223.	225.	238.	239.	241.	243.
Green Foxtail,	1,540			130	66	312	36		64	108	90	405	7	13	2,295	43
Yellow Foxtail,	275			52				54			45					
Lady's Thumb,	33	76	23	52	49	68	36		32	54		43	67	31		54
Rugel's Plantain,								36	32	324	450	324	13	94		22
Ribgrass,	3,360	95			114			720		675	315	378		94	81	43
Pursh's Plantain,	88									54	9			6		5
Sheep Sorrel,	22				49	435	48			27				6		
Curled Dock,				52	33	87	48	72	64	135	135	65	13	13		16
Willow-leaved Dock,																
Tumble-weed,		95		26	16	52					9	5		13		11
Heal-all,										27						5
Meadow Fescue,																
Finger Grass,	660															
Witch Grass,	44											54				11
Spotted Spurge,									32							
Ragweed,																
Lamb's Quarters,						609	24		32			11				
Wild Peppergrass,					490											
Barnyard Grass,												16	20			
Timothy,	44															5
Total Foreign Seeds in One Pound	6,006	206	23	312	817	1,563	192	882	256	1,404	1,053	1,301	130	270	2,376	215

MAMMOTH RED CLOVER.

There were eighteen samples of Mammoth Red Clover sent for tests. They were, in general, fully up to the required standards in purity and germination. In a few samples the impurities consisted of dead seeds, broken stems and other dirt in quantities too great to be acceptable at the prices charged. The weed seed impurities were much the same as in the Medium Red Clover. Two samples were absolutely clean of all impurities, and yet the prices of them were only the average market price of good seed, that is, $5.75 and $6.00 respectively. In several instances the dull color of the seed was noticeable, indicating old seed, and the germination of such samples sustained the diagnosis in each case. The range of prices of Mammoth Clover was not so great as of the Medium Red, as no samples of suspiciously cheap seeds were submitted. In consequence of this, the cheapest samples of the table below were the cheapest seeds to buy in point of good seeds.

White Clover. Though uncalled for, two samples of White Clover were received and the results of their tests are given. In one case the purity and germination both drop below the standards required, and though the selling price was one dollar cheaper than the other sample, the cost of pure germinable seed was seventy-three cents per bushel greater.

Alfalfa. Two samples of alfalfa were also received and submitted to tests. Their color was not as bright as fresh seed usually bears and their germination was much below the required per cent. Alfalfa is but little used in Pennsylvania and the seed is likely to be held over by unscrupulous dealers.

MAMMOTH RED CLOVER.

Character and Cost of the Seeds on the Market. Standard of Purity, 98 Per cent. Standard of Germination, 85-90 per cent.

Number of Sample.	Per cent. pure seed.	Per cent. germination in five days.	Total per cent. germination in fourteen days.	Per cent. of pure germinable seed.	Selling price per bushel.	Number of foreign seeds in one pound of sample.	Cost of pure germinable seed per bushel.
17,	99.1	73.8	76.5	75.8	$6 00	1,446	$7 92
31,	100	84	89.3	89.3	6 00	33	6 72
39,	99.5	91	94.3	93.8	6 00	806	6 40
43,	99.9	82	88	87.9	6 25	168	7 12
49,	99.6	69	70.8	70.5	6 50	1,170	9 22
54,	99.9	94	96	95.9	6 00	266	6 26
58,	99.0	76.8	79.5	78.7	6 75	2,959	8 58
69,	98.0	63.3	65.8	64.5	5 50	6,431	8 53
75,	97.4	87.3	90.8	88.4	5 25	1,120	5 94
84,	95.6	88	89.8	85.8	5 50	504	6 41
85,	95.1	91	93	88.4	6 75	14,000	7 64
86,	100	90.5	90.5	90.5	5 75	0	6 35
90,	99.4	88.3	90.5	90.0	6 25	425	6 94
93,	99.8	86	89.8	89.6	5 75	169	6 42
120,	99.2	85.5	89.3	88.6	6 00	632	6 77
151,	97.1	86.8	91.5	88.8	5 25	3,800	5 91
174,	87.0	85	85.8	74.6	5 60	672	7 51
181,	98.2	87.8	89	87.4	5 75	1,332	6 58

MAMMOTH RED CLOVER.

Number and Character of Foreign Seeds in a Pound of Each Sample.

																		White Clover.		Alfalfa.	
Number of Sample.	17.	31.	39.	43.	49.	54.	58.	69.	75.	84.	85.	86.	90.	93.	120.	151	174.	181.	163.	168.	96.	208.
Tumble-weed,	165	11				25		667					17	46			192	12	104			
Sheep Sorrel,	103		650			89				28							96	480	5,200	1,350		
Willow-leaved Dock,	211	11	78	126	50	152	88	3,497	56	112				77					104			
Pursh's Plaintain,	27				40		88										32					
Ribgrass,	396	11			1,000		2,640	667	1,050						27	500	96	36				
Lady's Thumb,	231			42	80		88	1.600		196			119	46			64	60		18		
Timothy,	231		78							168						3,300			7,800			192
Yellow Foxtail,	79						33															
Lamb's Quarters,							22											360	2,600	2,250		
Heal-all,									14													
Green Foxtail,											14,000		289		550		32	204				
Spotted Spurge,															55							
Curled Dock,																	160	180				
Clover, Red,																			2,600		2,880	
Alsike,																						32
Total Foreign Seeds in One Pound,	1.446	33	806	168	1 170	266	2,959	6,431	1,120	504	14,000	0	425	169	632	3,800	672	1,332	18,408	3,618	2,880	224

WHITE CLOVER.

Character and Cost of the Seeds on the Market. Standard of Purity, 95 Per cent. Standard of Germination, 75-80 Per cent.

Number of Sample.	Per cent. pure seed.	Per cent. germination in five days.	Total per cent. germination in fourteen days.	Per cent. of pure germinable seed.	Selling price per bushel.	Number of foreign seeds in one pound of sample.	Cost of pure germinable seed per bushel.
163, ...	94.0	48.3	73.8	69.4	$9 00	18,408	$12 97
168, ...	99.0	38.3	82.5	81.7	10 00	3,618	12 24

ALFALFA.

Character and Cost of the Seeds on the Market. Standard of Purity, 98 Per cent. Standard of Germination, 85-90 per cent.

Number of Sample.	Per cent. pure seed.	Per cent. germination in five days.	Total per cent. germination in fourteen days.	Per cent. of pure germinable seed.	Selling price per bushel.	Number of foreign seeds in one pound of sample.	Cost of pure germinable seed per bushel.
96, ...	99.0	58.5	58.5	57.9	$5 00	2,880	$8 64
208, ...	99.8	79.3	79.3	79.1	7 20	224	9 10

CRIMSON CLOVER.

Out of thirteen samples of Crimson Clover, not one contained sufficient impurities to drop it below the standard of purity. The seed is larger than any other clover, and being rounded and smooth can easily be separated from foreign seeds and inert materials. It will be observed from the table below, however, that the farmers must be very suspicious of the viability of Crimson Clover seed, especially is this true if the seed has a dark appearance. Sample No. 6 contained a large number of dark seeds and the per cent. of germination was only 72.2. Sample No. 12 was reported as seed of the crop of 1898 and was very dark throughout, having perhaps 15 per cent. of light colored seed. The per cent. of germination of this sample was only 27.5. The selling price was not reported, but assuming that $5.00 per bushel is charged, the cost of pure viable seed would be $17.52. A practically worthless case is sample No. 25, in which nearly every seed was dark, and weed seeds were not uncommon. It was reported as of the crop of 1899, which must have been a mistake. In purchasing this seed at $5.00 per bushel, the farmer actually pays at the rate of $217.39 for a bushel of pure germinable seed. But the fact is he sows in good faith, believing the seed to be viable, and gets no "stand" of clover, which is charged to unfavorable weather or improper methods of seeding. Samples Nos. 63, 89, 173, 182 and 244 were all bright, light colored seeds, noticeably fresh, and were the only samples which tested above the standard of germination required for good seed. Nos. 94, 161 and 205 contained a large percentage of dark seeds, and the consequence is well measured by the results of the germination tests.

CRIMSON CLOVER.

Character and Cost of the Seeds on the Market. Standard of Purity, 98 Per cent. Standard of Germination, 85-90 per cent.

Number of Sample.	Per cent. pure seed.	Per cent. germination in five days.	Total per cent. germination in fourteen days.	Per cent. of pure germinable seed.	Selling price per bushel.	Number of foreign seeds in one pound of sample.	Cost of pure germinable seed per bushel.
6,	99.9	70.5	72.3	72.2	$4 25	66	$5 88
12,	99.7	27.5	27.5	27.4	....	506	....
25,	98.4	2.3	2.3	2.3	5 00	2,170	217 39
63,	99.9	93.8	96.3	96.2	5 25	64	5 46
89,	98.8	87.5	87.5	86.5	3 50	1,150	4 05
94,	99.2	41	41	37.8	5 75	280	15 21
133,	99.1	76.8	78.3	77.6	5 00	1,770	6 44
161,	98.2	44	44	43.2	3 00	1,464	6 94
173,	99.7	94.3	94.5	94.2	4 75	819	5 04
182,	99.2	92.3	94.3	93.5	5 25	814	5 61
205,	99.9	62	62	61.9	4 60	0	7 43
210,	99.9	80	80.3	80.2	....	0	....
244,	99.8	94.8	96.3	96.1	....	77	....

CRIMSON CLOVER.

Number and Character of Foreign Seeds in a Pound of Each Sample.

Number of Sample.	6.	12.	25.	63.	89.	94.	133.	161.	173.	182.	205.	210.	244.
Timothy,	66	33	25										
Ribgrass,		32		48						47			33
Sheep Sorrel,		98	443				120	304	735	425			33
Green Foxtail,		245	1,422										
Yellow Foxtail,		98											
Lamb's Quarters,			51										
Bulbous Buttercup,			76					76					
Willow-leaved Dock,			102	16				76					
Tumble-weed,			51		250								
Clover, Red,					900	245	105	185		240			
Corn, Gromwell,						35							
Bicknell's Crane's Bill,							1,500						
Black Medic,							15	152	63				
Curled Dock,							30			37			11
Black Henbane,								190					
Black Mustard,								481					
Cabbage,									21	56			
Flax,										9			
Total Foreign Seeds in One Pound,	66	506	2,170	64	1,150	280	1,770	1,464	819	814	0	0	77

So uniformly did the percentage of germination of Crimson Clover samples correspond with the proportion of bright, light-colored seeds in the samples, that Mr. W. H. Thompson, who was making the germination tests, was led to separate the dark and light seeds of eight samples and try them independently in the germinator. The results are shown in the following figures. It will be seen that even in the best samples there are some seeds darker than the rest, but they possess the brightness that belongs to fresh seed, and dark seed does not necessarily mean dead seed. However, in every case, it will be seen the dark seeds gave fewer germinations than did the light seeds.

CRIMSON CLOVER.

Comparison of Germination Power of Dark and Light Colored Seeds in Same Sample.

Number of Sample.	Per cent. germinated, sample.	Per cent. germinated, light seed.	Per cent. germinated, dark seed.
12,	27.5	80	17
63,	96.3	99	87
94,	41	45	21
133,	78.3	96	56
161,	44	38	10
173,	94.5	96	84
182,	94.3	99	76
205,	62	80	17

ALSIKE.

There were sixteen samples of Alsike examined, and of these one-half fell below the standard of purity, 95 per cent. The impurities were essentially weed seed in most cases. Timothy and Sheep Sorrel were most abundant. Docks and Tumble-weed were frequent. The Alsike seed of a few specimens were dull colored, indicating age, and in fact three samples were reported as old seed. Though the standard of germination for Alsike is placed as low as 75 per cent., one-half of the samples tested in the germinator failed to reach the required figure even though, as is customary with all clover germinations, one-third of the seeds remaining sound at the conclusion of the test was counted in as germinable seed. Samples Nos. 10 and 71 were old, dull colored seed and though sold at $8.00 and $7.50 respectively, the farmer actually paid more than $26.00 per bushel for pure germinable seed. He obtained with his purchase a larger supply of Sheep Sorrel and Tumble-weed seed than was needed upon his farm and passes his thin catch of Alsike in the field with the observation that the season was very unfavorable for the seed to catch.

ALSIKE.

Character and Cost of the Seeds on the Market. Standard of Purity, 95 Per cent. Standard of Germination, 75-80 Per cent.

Number of Sample.	Per cent. pure seed.	Per cent. germination in five days.	Total per cent. germination in fourteen days.	Per cent. of pure germinable seed.	Selling price per bushel.	Number of foreign seeds in one pound of sample.	Cost of pure germinable seed per bushel.
10,	91.2	29.3	33.3	30.4	$8 00	9,150	$26 31
32,	99.0	49	53	52.5	7 50	2,209	14 28
37,	99.2	86.5	90.0	89.3	7.50	1,620	8 38
44,	99.1	88.8	92.8	92.0	7 00	4,732	7 61
71,	96.2	27	29.3	28.1	7 50	14,763	26 69
77,	90.3	58.8	62.8	56.7	8 00	25,872	14 11
82,	74.2	96.5	97.5	72.3	7 50	91,224	10 37
95,	97.6	64.5	69.3	67.5	6 75	9,600	10 00
101,	86.0	77.8	84	72.2	5 75	41,860	7 96
117,	87.3	87.8	91.3	79.7	6 00	40,420	7 53
130,	94.6	69.8	76	71.9	6 50	5,810	9 04
145,	84.2	58.5	64.8	54.6	3 50	48,467	6 41
172,	95.0	70.5	73.8	70.1	6 25	15,840	8 91
180,	99.5	72.8	77.3	76.9	7 50	1,316	9 75
209	99.2	85.3	88.8	88.1	8 00	2,167	9 08
216,	91.5	70.0	70.8	64.3	9 00	28,470	13 89

ALSIKE.

Number and Character of Foreign Seeds in a Pound of Each Sample.

Number of Sample.	10.	32.	37.	44.	71.	77.	82.	95.	101.	117.	130.	145.	172.	180	209	216.
Timothy,	2,400	1,778	1,620	520	3,040	2,400	91,200	....	41,600	....	....	1,560	6,400	1,118	1,667	25,000
Sheep Sorrel,	5,416	381	....	3,900	11,400	20,400	....	9,600	....	39,200	5,480	39,000	6,400	38	....	2,500
Tumble-weed,	1,334	....	....	....	19	....	24	....	....	....	165	468	....	....	133	....
Willow-leaved Dock,	....	50	....	312	304	192	....	....	....	....	....	....	....	....	....	....
Lady's Thumb,	....	....	....	....	....	768	....	....	....	....	....	....	....	....	....	....
Green Foxtail,	....	....	....	....	....	576	....	....	....	....	....	749	....	....	....	....
Lamb's Quarters,	....	....	....	....	....	1,536	....	....	....	....	....	6,240	2,240	....	....	....
Red Clover,	....	....	....	....	....	....	....	....	260	560	....	500	....	....	....	20
Curled Dock,	....	....	....	....	....	....	....	....	....	560	110	250	800	150	100	500
Ribgrass,	....	....	....	....	....	....	....	....	....	....	55	....	....	....	....	450
Witch Grass,	....	....	....	....	....	....	....	....	....	....	....	....	....	....	267	....
Total Foreign Seeds in One Pound, ...	9,150	2,209	1,620	4,732	14,763	25,872	91,224	9,600	41,860	40,420	5,810	48,467	15,840	1,316	2,167	28,470

TIMOTHY.

Ordinarily, Timothy seed is exceedingly pure because it is easily cleaned, and the nature of the seed will not permit of adulterations, as in the case of other grasses. Among thirty-nine samples examined only three fell slightly below the required standard, and five of them were so nearly perfect, that they were rated 100 per cent. in purity. The quantity of weed seed was excessive in but a few samples and the obnoxious kinds were commonly the seeds of Lamb's Quarters and Rugel's Plantain. Nos. 81, 91 and 99 were labeled "Star Timothy." No. 100 was labeled "A No. 1," No. 88 "S. P. V. Timothy," and No. 204, "Choice." These were alike in being exceedingly clean and having high germinative power.

Old seeds failed rapidly in germination. While the age of the samples was not generally reported, it is not difficult to select from the table below the seeds which were not fresh. Sample No. 211 was the only one reported as of the crop of 1898, but before the germination tests were made, a record in our books was made of the "dull appearance of seed" in samples No. 124, 149 and 164. These four samples all failed to reach even 80 per cent. in germination. In consequence of this, sample No. 124 was the most costly Timothy seed for the farmer to buy. The standard per cent. of germination fixed by the United States Department of Agriculture, 85-90 per cent. for Timothy, can be easily maintained by the seedsman, and it is quite certain to reject old seed.

TIMOTHY.

Character and Cost of the Seeds on the Market. Standard of Purity, 98 Per cent. Standard of Germination, 85-90 per cent.

Number of Sample.	Per cent. pure seed.	Per cent. germination in five days.	Total per cent. germination in fourteen days.	Per cent. of pure germinable seed.	Selling price per bushel.	Number of foreign seeds in one pound of sample.	Cost of pure germinable seed per bushel.
2,	99.5	78	82	81.6	$2 00	589	$2 43
9,	99.2	89.5	93	92.3	1 75	10	1 89
15,	99.8	93.6	97.5	97.3	2 00	153	2 06
18,	99.0	87.8	92.8	91.9	1 75	3,683	1 90
20,	99.4	85.5	87.3	86.8	1 76	1,975	2 03
22,	99.9	88.3	89.5	89.4	2 00	470	2 24
33,	98.2	92	94	92.3	1 75	784	1 90
36,	98.8	92.3	97	95.8	1 60	1,330	1 67
41,	99.2	90.8	93.8	93.0	1 60	230	1 72
48,	98.9	87	89.8	88.8	1 75	3,019	1 97
53,	99.6	89.5	92.5	92.1	1 75	960	1 90
57,	97.4	90.0	92.8	90.4	1 75	2,610	1 94
61,	99.9	88	90.0	89.9	1 50	36	1 67
67,	99.0	90	92.8	91.9	1 50	2,310	1 63
74,	99.5	96	96.8	96.3	1 45	1,596	1 51
81,	100	92	93.8	93.8	2 10	0	2 24
87.	99.9	87.5	90.8	90.7	2 10	490	2 32
88	99.9	90.8	92.5	92.4	1 55	392	1 68
91,	100	87.8	91.3	91.3	2 50	0	2 74
99,	100	85.3	95.5	95.5	2 25	0	2 36
100,	100	91.5	92.8	92.8	2 00	12	2 16
103,	98.4	74.3	91.5	90.0	1 40	456	1 56
104,	98.1	88.5	94.8	93.0	1 65	1,456	1 77
114,	99.9	91.3	96.3	96.2	1 65	96	1 72
124,	99.2	60.8	73	72.4	2 50	0	3 45
129,	98.0	77.8	90.5	88.7	1 40	0	1 58
137,	98.6	92.5	96.5	95.1	1 75	2,080	1 84
149,	100	69.3	78.3	78.3	1 50	30	1 92
154,	99.8	92.8	98	97.8	1 75	375	1 79
158,	99.8	83.8	92.8	92.6	1 50	135	1 62
164,	99.8	62.8	68.3	68.2	1 50	0	2 26
169,	98.9	78.8	85.5	84.6	1 50	464	1 77
183,	98.1	88.5	92.5	90.7	1 50	4,680	1 65
189,	97.6	84.5	90.5	88.3	1 65	2,465	1 87
204.	99.2	89.3	94.8	94.0	1 35	252	1 44
211,	98.1	67	78.3	76.7	90	7,182	1 17
222,	93.2	86.3	93.3	87.0	1 75	14,478	2.01
224,	99.5	88.8	94.0	93.5	1 75	1,243	1 87
240,	100	90	93	93.0	1 75	128	1 88

TIMOTHY.

Number and Character of Foreign Seeds in a Pound of Each Sample.

Number of Sample.	2.	9.	15.	18.	20.	22.	33.	36.	41.	48.	53.	57.	61.
Red Clover,	475	....	....	411	....	350	160	....	138	....	480	300	....
Lamb's Quarters,	76	10	51	195	256	40	280	....	46	311	240	525	....
Rugel's Plantain,	38	....	....	2,749	237	....	280	1,000	....	2,640	240	1,500	36
Sheep Sorrel,	....	....	77	....	....	....	....	....	....	....	....	15	....
Lady's Thumb,	....	....	25	....	94	....	....	250	46	....	....	15	....
White Vervain,	....	....	....	337	175	....	64	80	....	....	....	240	....
Wild Peppergrass,	....	....	....	....	1,167	80	....	....	....	....	....	....	....
Green Foxtail,	....	....	....	....	46	....	....	....	....	....	....	15	....
Tumble-weed,	....	....	....	....	....	....	....	....	....	68	....	....	....
Parsnip,	....	....	....	....	....	....	....	....	....	....	....	....	....
Ribgrass,	....	....	....	....	....	....	....	....	....	....	....	....	....
White Clover,	....	....	....	....	....	....	....	....	....	....	....	....	....
Alsike,	....	....	....	....	....	....	....	....	....	....	....	....	....
Curled Dock,	....	....	....	....	....	....	....	....	....	....	....	....	....
Total Foreign Seeds in One Pound, ...	589	10	153	3,683	1,975	470	784	1,330	230	3,019	960	2,610	36

TIMOTHY.

Number and Character of Foreign Seeds in a Pound of Each Sample—Continued.

Number of Sample.	67.	74.	81.	87.	88.	91.	99.	100.	103.	104.	114.	124.	129.
Red Clover.	1,500	665			112			12		128			
Lamb's Quarters.		855		35	196				456	1,136	96		
Rugel's Plantain,	120	76		350	84								
Sheep Sorrel.	30												
Lady's Thumb.	30												
White Vervain,				35									
Wild Peppergrass,				70									
Green Foxtail,													
Tumble-weed,	15												
Parsnip.	615												
Ribgrass.													
White Clover,													
Alsike,													
Curled Dock,													
Total Foreign Seeds in One Pound,	2,310	1,596	0	490	392	0	0	12	456	1,456	96	0	0

TIMOTHY.

Number and Character of Foreign Seeds in a Pound of Each Sample—Continued.

Number of Sample.	137.	149.	154.	158.	164.	169.	183.	189.	204.	211.	222.	224.	240.
Red Clover,	....	....	375	81	....	64	1,800	150	126	294	....	275	....
Lamb's Quarters,	80	15	....	27	....	320	720	1,350	....	42	5,715	110	37
Rugel's Plantain,	2,000	....	....	....	....	....	1,800	450	....	420	2,540	220	13
Sheep Sorrel,	....	....	....	....	....	13	....	....	....	....	127	....	....
Lady's Thumb,	....	15	....	27	....	....	....	....	....	....	....	....	....
White Vervain,	....	....	....	....	....	16	....	60	....	....	254	99	....
Wild Peppergrass,	....	....	....	....	....	48	180	455	42	126	508	66	18
Green Foxtail,	....	....	....	....	....	....	....	....	....	....	....	11	....
Tumble-weed,	....	....	....	....	....	....	180	....	....	....	254	....	....
Parsnip,	....	....	....	....	....	....	....	....	....	....	....	....	....
Ribgrass,	....	....	....	....	....	....	....	....	84	....	....	....	....
White Clover,	....	....	....	....	....	....	....	....	....	6,300	....	440	....
Alsike,	....	....	....	....	....	....	....	....	....	....	5,080	....	55
Curled Dock,	....	....	....	....	....	....	....	....	....	....	....	22	....
Total Foreign Seed in One Pound,	2,080	30	275	135	0	464	4,680	2,465	252	7,182	14,478	1,243	123

ORCHARD GRASS.

There is great variation in the germinative power of Orchard Grass. The seventeen samples ranged anywhere between 33 and 96 per cent. and while the selling price per bushel did not vary much from $2.00 per bushel, the cost of pure germinable seed ran from $2.08 to $7.72. The chance for adulteration is great, and frequently Meadow Fescue is liberally employed, but this grass seed was present in but two samples of Orchard Grass and then in such small quantities as to be an incidental impurity. The foreign seeds most commonly present are Red Clover, Curled Dock, Wild Peppergrass, Ribgrass and Sheep Sorrel. The bulkiest impurity is chaff and broken stems and leaves.

MILLETS.

Five samples of Millets were sent in by the agents of the Department of Agriculture. These also show the greatest variation in cleanness and germination. It is an easy matter to clean millet seed with the modern cleaning machine, and there is no excuse for more than one per cent. of impurity in any sample.

ORCHARD GRASS.

Character and Cost of the Seeds on the Market. Standard of Purity, 90 Per cent. Standard of Germination (not yet fixed).

Number of Sample.	Per cent. pure seed.	Per cent. germination in five days.	Total per cent. germination in fourteen days.	Per cent. of pure germinable seed.	Selling price per bushel.	Number of foreign seeds in one pound of sample.	Cost of pure germinable seed per bushel.
3,	92.4	26.5	34.5	31.9	$2 25	8,050	$7 05
11,	91.2	37.5	61.3	57.7	2 10	4,250	3 64
23,	97.5	14.3	77	75.1	2 00	750	2 66
42,	95.8	32.5	78.8	75.5	2 00	2,088.	2 65
62,	91.4	19.8	62.8	57.4	1 60	4.080	2 79
68,	97.2	35.5	79.3	77.1	1 75	2,610	2 27
107,	95.2	49.5	75.8	72.2	1 50	2,080	2 08
118,	92.8	63	75	70.4	1 50	1,486	2 13
126,	98.2	17	33	32.4	2 50	1,393	7 72
128,	93.6	59	70.3	65.8	1 50	1,171	2 28
143,	87.3	60.8	82.5	72.0	2 10	1,995	2 92
156,	90.4	95.3	96	86.8	2 40	1,272	2 76
165,	91.0	30	75.3	68.5	2 00	1,960	2 92
171,	92.4	27.5	64.8	59.9	1 75	800	2 92
185,	82.3	30.5	67.8	55.8	1 75	6.364	3 14
191,	88.3	44.5	66	58.3	2 00	450	3 43
196,	96.4	32.3	70.8	68.3	1 75	760	2 55

ORCHARD GRASS.

Number and Character of Foreign Seeds in a Pound of Each Sample.

Number of Sample.	3.	11	23	42.	62.	68.	107.	118.	126.	128.	143.	156.	165.	171.	185.	191.	196.
Sheep Sorrel,	7,875	407	....	....	1,265	580	....	26	58	....	105	....	....	50	555	....	144
Ribgrass,	35	....	120	....	1,050	290	520	156	58	165	84	....	35	50	....	60	140
Wild Peppergrass,	140	3,050	180	464	105	174	....	....	174	....	126	....	175	....	....	20	28
Meadow Fescue,	....	305	....	....	....	....	....	....	406	....	....	....	....	....	....	....	....
Curled Dock,	....	305	120	1,508	820	870	1,170	706	117	825	1,050	72	1,225	500	925	300	168
Wheat,	....	30	....	....	....	....	....	26	....	16	....	....	....	....	74	....	....
Red Clover,	....	153	240	116	840	696	390	572	58	165	630	1,200	525	200	1,110	60	280
Pursh's Plantain,	....	....	90	....	....	....	....	....	464	....	....	....	....	....	....	....	....
Flax,	....	....	....	....	....	....	....	....	58	....	....	....	....	....	....	....	....
Timothy,	....	....	....	....	....	....	....	....	....	....	....	....	....	....	3,700	....	....
Total Foreign Seeds in One Pound,	8,050	4,250	750	2,088	4,080	2,610	2,080	1,486	1,393	1,171	1,995	1,272	1,960	800	6,364	450	760

MILLETS.

Character and Cost of the Seeds on the Market. Standard of Purity, 99 Per cent. Standard of Germination, 85-90 Per cent.

Number of Sample.	Per cent. pure seed.	Per cent. germination in five days.	Total per cent. germination in fourteen days.	Per cent. of pure germinable seed.	Selling price per bushel.	Number of foreign seeds in one pound of sample.	Cost of pure germinable seed per bushel.
27,	100	95.5	96	96	$1 40	0	$1 46
28,	100	57.8	58	58	1 25	0	2 16
146,	99.9	91.5	91.5	91.4	3 50	68	3 83
217,	98.2	87.8	88.3	86.7	1 60	3,200	1 84
218,	93.3	77.8	77.8	72.6	1 25	16,240	1 72

MILLETS.

Number and Character of Foreign Seeds in a Pound of Each Sample.

Number of Sample.	27.	28.	146.	217.	218.
Lady's Thumb,	....	....	27	150	30
Lamb's Quarters,	....	....	41	....	30
Tumble-weed,	....	....	....	10	20
Witch Grass,	....	....	....	40	16,000
Finger Grass,	....	....	....	3,000	....
White Vervain,	....	....	....	....	150
Rugel's Plantain,	....	....	....	....	10
Total Foreign Seeds in One Pound,...	0	0	68	3,200	16,240

KENTUCKY BLUE GRASS.

The greatest extremes in quality of seeds were met with among the samples of Kentucky Blue Grass. There were twenty-three samples submitted to tests. Four of them were "lawn mixtures." No. 16 contained 15 per cent. of White Clover; No. 26 was composed of 15 per cent. White Clover, 20 per cent. Timothy, 15 per cent. Meadow Fescue and 50 per cent. Kentucky Blue Grass (by weight); No. 80 contained 60 per cent. of White Clover, and No. 83 had in it 25 per cent. of Orchard Grass and 9 per cent. of White Clover. The germination tests in these cases were made of the Blue Grass only. The seed of sample No. 21 was dark in color and had a musty smell. Several samples had considerable chaff, and No. 160 had, besides the few seeds accredited to it in the table of foreign seeds, a goodly supply of White Clover and Timothy. Only four of the twenty-three samples reached the required standard in germination. All these tests of Blue Grass were made in sand in the greenhouse, the final record being taken after 30 days. By referring to the table below, it will be observed that the price of pure germinable seed is generally very high with reference to the samples examined.

KENTUCKY BLUE GRASS.

Character and Cost of the Seeds on the Market. Standard of Purity, 90 Per cent. Standard of Germination, 45-50 Per cent.

Number of Sample.	Per cent. pure seed.	Total germination in thirty days.	Per cent. pure germinable seed.	Selling price per bushel.	Number of foreign seeds in one pound of sample.	Cost of pure germinable seed per bushel.
1,	76.1	9	6.8	$2 50	16,266	$36 76
16,	Mixture.	47.5	....	25 lb.	608	....
21,	84.3	8.2	6.9	1 50	4,293	21 74
26,	Mixture.	18	....	18 qt.	233	....
35,	88.5	4	3.5	1 60	448	45 71
40,	82.4	33	2.8	2 00	2,720	71 43
60,	72.5	3	2.2	1 25	560	56 82
66,	68.4	8	5.5	1 00	1,400	18 18
80,	Mixture.	36	....	20 lb.	165	....
83,	Mixture.	48	....	20 lb.	490	....
106,	89.2	46.3	40.0	1 50	1,860	3 75
112,	74.3	8	5.9	1 35	2,380	22 88
115,	62.4	9	5.6	1 75	486	31 25
125,	68.6	7	4.8	2 50	2,212	52 08
134,	72.6	5	3.6	08 lb.	2,560	2 22 lb.
144,	79.2	22	17.5	20 lb.	16,354	1 14 lb.
155,	68.0	20	13.6	2 80	1,233	20 59
160,	62.5	6	3.8	1 40	650	36 84
167,	74.4	26	19.3	1 50	12,936	7 77
170,	72.8	32	23.3	1 75	30,065	7 51
184,	85.4	14	12.0	2 00	4,009	16 67
190,	90.3	7	6.3	1 50	1,474	23 82
219,	93.1	55	51.2	20 lb.	2,310	39 lb.

KENTUCKY BLUE GRASS.

Number and Character of Foreign Seeds in a Pound of Each Sample.

Number of Sample.	1.	*16.	21.	*26.	35.	40.	60.	66.	*80.	*83.	106.	112.
Alsike,	16,000		2,700			960	210	750				2,020
Lady's Thumb,	166	19	1,107					450				148
Sedge,	100		459	83	416	544		150			1,860	37
Pursh's Plantain,		133										
Rugel's Plantain,		19										
Ribgrass,		57										
Curled Dock,		57				32						101
Sheep Sorrel,		95		83		224		50		210		
Wild Peppergrass,		76				64						
Red Clover,		152	27		32	32			55	210		74
Lamb's Quarters,				33			70		110	70		
Flax,				17								
Tall Meadow Fescue,				17								
White Vervain,						64						
Timothy,						800	280					
White Clover,												
Rye Grass,												
Total Foreign Seeds in One Pound of Sample,	16,266	608	4,293	233	448	2,720	560	1,400	165	490	1,860	2,380

*Lawn grass mixture.

KENTUCKY BLUE GRASS.

Number and Character of Foreign Seeds in a Pound of Each Sample—Continued.

Number of Sample.	115.	125.	134.	144.	155.	160.	167.	170.	184.	190.	219.
Alsike,			800	16,120	833		9,600	4,200	3,800	1,100	
Lady's Thumb,								70	95	132	
Sedge,	270	560	300	140	333			245		154	42
Pursh's Plantain,	54										
Rugel's Plantain.						650					
Ribgrass.											
Curled Dock,			20	47			48	70	19	22	42
Sheep Sorrel,		467	140		67			1,750		22	21
Wild Peppergrass,	54			47						44	84
Red Clover,	27						288	21,000	95		
Lamb's Quarters.			300				24	70			
Flax,											
Tall Meadow Fescue,											
White Vervain,											21
Timothy,			1,000				2,400	2,625			
White Clover,	81	1,185									2,100
Rye Grass,							576	35			
Total Foreign Seeds in One Pound of Sample,	486	2,212	2,560	16.354	1,233	650	12,936	30,065	4,009	1,474	2,310

VEGETABLE SEEDS.

Frauds in vegetable seeds cannot be easily detected. They are usually of a different character from that of the frauds perpetrated in agricultural seeds. Purity of variety or strain among vegetable seeds is what gives them their special value and it is utterly impossible to detect any imposition in this regard by a study of the seeds. Most vegetable seeds are supplied to the purchaser 100 per cent. pure, so far as foreign seeds and materials are concerned, and the per cent. of germination will commonly run over 90 per cent. in fresh seeds. Samples of onions, sweet corn and cauliflower were chosen because large quantities of the two first named are used by farmers and gardeners, and sometimes considerable complaint is made about the results obtained from them. Cauliflower seed, particularly of the Dwarf Erfurt variety, is imported and is expensive; hence the temptation to adulterate is strong. Frequently cauliflower seed is bought at $1.00 or more per ounce and the outcome of it is either few plants of cauliflower or many plants of cabbage. Low germination power can be detected by tests, but the substitution of cabbage for cauliflower seed cannot be easily determined.

Onions. Twenty-one samples of Onion seed were examined and all but three of them were 100 per cent. pure seed. Only the Yellow Globe Danvers was called for, and in the table below only this variety is represented. The impurities in No. 108 consisted of timothy seed which possibly entered the sample by accident. The impurities in No. 113 were seeds of timothy and clover. In No. 135 were many seeds of cabbage and a few of Lamb's Quarters. In the germination tests, seventeen of the twenty-one samples fell short of the standard of germination placed for onion seed. Two samples were below 25 per cent.

Cauliflower. Only a few samples of Cauliflower were received, and these were not all of the early Erfurt variety. No. 132 was labeled Paris Golden, and Nos. 187 and 198 were Early Snowball. The seed in every case was absolutely free from dirt and foreign seeds. Germination ran rather low in one-half of the samples and one was absolutely worthless, having the appearance of being old seed.

ONIONS—YELLOW GLOBE DANVERS.

Character and Cost of the Seeds on the Market. Standard of Purity, 99 Per cent. Standard of Germination, 80-85 Per cent.

Number of Sample.	Per cent. pure seed.	Per cent. germinated in five days.	Total per cent. germination in fourteen days.	Per cent. of pure germinable seed.	Selling price per pound.	Cost of pure germinable seed per pound.
7,	100	60.5	66	66.0	$2 00	$3 03
13,	100	70.3	77.5	77.5	1 50	1 94
30,	100	55.3	56.5	56.5	1 50	2 65
47,	100	80.8	91.3	91.3	1 50	1 64
52,	100	82.5	83.5	83.5	1 50	1 79
73,	100	80.5	84.8	84.8	1 25	1 47
79,	100	89	90.5	90.5	1 50	1 66
98,	100	56	62.5	62.5	1 40	2 24
108,	99.8	57.3	60.3	60.2	1 50	2 49
110,	100	76.5	77.3	77.3	1 50	1 94
113,	99.8	20.5	21.8	21.8	1 60	7 34
122,	100	46.5	50.8	50.8	90	1 79
135,	98.1	72.5	79.3	77.8	1 00	1 29
139,	100	87	87.3	87.3	....	....
153,	100	69.8	70.3	70.3	1 25	1 78
176,	100	63.3	66	66.0	....	....
188,	100	74.5	75.3	75.3	....	....
194,	100	21.8	24.5	24.5	....	....
197,	100	80.3	83	83.0	1 25	1 51
213,	100	63	64.8	64.8	05 oz.	077 oz.
214,	100	60.3	65.8	65.8	05 oz.	076 oz.
215,	100	40.3	44.8	44.8	05 oz.	111 oz.
221,	100	48	57.3	57.3	05 oz.	087 oz.

CAULIFLOWER.

Character and Cost of the Seeds on the Market. Standard of Purity, 99 Per Cent. Standard of Germination, 80-85 Per Cent.

Number of Sample.	Per cent. pure seed.	Per cent. germinated in five days.	Total per cent. germination in fourteen days.	Per cent. of pure germinable seed.	Selling price per pound.	Cost of pure germinable seed per pound.
65,	100	89.3	89.5	89.5	$1 00 oz.	$1 12 oz.
121,	100	60.8	65.5	65.5	1 00 oz.	1 53 oz.
132,	100	54.8	55	55.0	80 oz.	1 45 oz.
141,	100	79.8	82.5	82.5	1 35 oz.	1 64 oz.
147,	100	73	74.5	74.5	....	....
177,	100	0	0	0.0	....	....
187,	100	66	68	68.0	1 00 oz.	1 47 oz.
198,	100	89	90.3	90.3	....	....

Sweet Corn. There is very little opportunity for fraud in Sweet Corn seed. The impurities are reduced to nothing, and many of the varieties can be readily identified by the grains. It is possible, however, to sell seeds of low germinative power and thus impose upon the purchaser. Out of twenty-five samples of the Stowell's Evergreen Corn, only three samples fell below the standard per cent. in germination, one sample being so low as 53.5 per cent. The prices varied greatly without apparent cause. It is certain the prices in no manner corresponded with the germinative power of the seeds.

SWEET CORN—STOWELL'S EVERGREEN.

Character and Cost of the Seeds on the Market. Standard of Purity, 99 Per cent. Standard of Germination, 85-90 Per cent.

Number of Sample.	Per cent. pure seed.	Per cent. germinated in five days.	Total per cent. germinated in fourteen days.	Per cent. of pure germinable seed.	Selling price.	Cost, of pure germinable seed.
8,	100	86	88	88	$2 50 bu.	$2 84 bu.
14,	100	96	96	96	2 50 bu.	2 60 bu.
29,	100	88.5	88.5	88.5	10 pt.	11 oz.
46,	100	91	91	91	10 qt.	11 qt.
51,	100	98	98	98	2 25 bu.	2 30 bu.
56,	100	97.5	97.5	97.5	2 00 bu.	2 05 bu.
64,	100	98.5	98.5	98.5	1 75 bu.	1 78 bu.
72,	100	86	86	86	2 50 bu.	2 91 bu.
78,	100	90	90	90	10 qt.	11 qt.
97,	100	93	93	93	2 25 bu.	2 42 bu.
109,	100	89	91.5	91.5	10 pt.	11 pt.
111,	100	97.5	97.5	97.5	10 pt.	10 pt.
123,	100	92	92	92	1 75 bu.	1 90 bu.
127,	100	93.5	94	94	10 qt.	11 qt.
136,	100	79	81	81	10 qt.	12 qt.
140,	100	51	53.5	53.5	2 50 bu.	4 67 bu.
148,	100	95.5	95.5	95.5	15 qt.	16 qt.
157,	100	99.5	99.5	99.5	10 qt.	10 qt.
178,	100	87.5	89	89	4 25 bu.	4 78 bu.
195,	100	94.5	94.5	94.5	4 50 bu.	4 76 bu.
199,	100	91.5	92	92	20 qt.	22 qt.
200,	100	97	97	97	....	....
201,	100	98.5	98.5	98.5	....	....
202,	100	98	98	98	....	....
203,	100	79.5	79.5	79.5	....	....

THE WEEDS REPRESENTED IN THE FOREIGN SEEDS.

In the list below, only those weeds are noted which were more or less common in the samples of seeds examined. Occasional seeds of many other kinds of weeds were found, but never in sufficient quantity to merit notice here. Every sample was carefully examined and the foreign seeds removed for identification which was greatly facilitated by the use of the five hundred samples of "Economic Seeds" distributed by the Division of Botany of the United States Department of Agriculture, supplemented by a collection of 2,000 samples possessed by the Pennsylvania State College.

On the whole, the samples of farm seeds were fairly well cleaned, and in the matter of purity, they were generally as high as or higher than the standard fixed by the United States Department of Agriculture. None of the weed seeds found could be classed with the Canada Thistle as regards their obnoxious characters. A very few of them are weeds not yet known to be in Pennsylvania.

Alsike (Trifolium hybridum L.) *Alsatian Clover. Swedish Clover.* Cultivated for fodder. Occurs as a weed in waste places from Nova Scotia to Idaho, south to New Jersey and Georgia. The seeds, which resemble that of White Clover, though much darker, occurred as an impurity, particularly in the Kentucky Blue Grass seed. For lawn purposes the presence of Alsike in the Blue Grass seed is objectionable; but for pasture fields it offers no disadvantage.

Barnyard Grass (Panicum Crus-galli L.) *Cockspur Grass.* A widely distributed weed, found all over the United States, and was introduced from Europe. It prefers rich land and is commonly found in great luxuriance in and about barnyards; hence the name. The seeds are large and can easily be separated from crops of agricultural seeds; therefore, it is seldom present in properly cleaned seeds. It was found in very small quantities only, and that in two samples of Red Clover.

Bicknell's Crane's-bill (Geranium Bicknelli Britton). A native plant at present found from Maine to Southern New York. It is an annual, growing 10 to 20 inches high. The seeds were present in only one sample of seed and that the Crimson Clover (sample No. 133), grown probably within the territory indicated above. While the plant as a weed may be easily controlled, no farmer wants to pay for seed that will be of no benefit to him. The seed of this Crane's-bill is much smaller than the Crimson Clover and could be easily separated.

Black Medic (Medicago lupulina L.) *Blackseed Hop Clover, Melilot Trefoil.* An annual clover-like plant introduced from Europe and widely distributed as a weed. The seeds occurred as an impurity in Crimson Clover only, and there in very small quantities. Not more than three samples contained it (Nos. 133, 161 and 173). Here again the seed is enough smaller than the seed of Crimson Clover that it could be easily and entirely separated in the cleaning process.

Black Mustard (Brassica nigra (L) Koch). A weed commonly known to farmers. It grows from 2 to 5 feet high and may be readily recognized by its turnip-like characters. The seeds closely resemble those of the turnip, and were present only in one sample of seeds under examination (No. 161), being a Crimson Clover reported as coming from Ohio.

Black Henbane (Hyoscyamus niger L). A member of the Nightshade family, naturalized from Europe, found in the Northern States from Nova Scotia to Michigan, south to New York. It grows from one to two feet high and has a very disagreeable odor about its leaves. The seeds were found, as in the preceding case, only in sample No. 161 Crimson Clover, from Ohio.

Bulbous Buttercup (Ranunculus bulbosus L). There are several Buttercups whose seeds are likely to occur in agricultural seeds. They are not very obnoxious weeds, but are widely distributed, being found mostly in wet places. A few seeds per pound were found in two samples of Crimson Clover from the West (Nos. 25 and 161). These two samples, though above the standard in purity, possessed the greatest amount of impurities of all in the Crimson Clover.

Cabbage (Brassica oleracea var.) Just how Cabbage could become an impurity in Crimson Clover seed is not easily accounted for. Possibly as an accident in the careless handling of the seeds in the store, rather than in the process of harvesting and cleaning. The Cabbage seed was found in two samples (No. 173 and 182), from the different stores in Pittsburg. It was also present in large quantity in a sample of Onion from Reading.

Clover, Red (Trifolium pratense L.) The seeds of Red Clover are a very common impurity in agricultural seeds and while it cannot be regarded as a weed in ordinary farm crops, it is often objectionable when it occurs in Blue Grass seed used upon lawns. It was present in about 50 per cent. of samples of Kentucky Blue Grass examined, 38 per cent. of Crimson Clover, 44 per cent. of Alsike, 94 per cent. of Orchard Grass and 50 per cent. of Timothy. Red Clover seed is more expensive than any of these just referred to, excepting the Alsike, and hence, where it is not objectionable in the crop it may be tolerated in the seed.

Clover, White (Trifolium repens L.) White Clover seed occurred as an impurity in only two samples of Timothy and three of Kentucky Blue Grass. Where the latter were marked "Mixtures" for lawns, the samples contained from 10 per cent. to 60 per cent. of White Clover. This was not recorded therefore as "impurity" in the tables of "foreign seeds."

Corn Gromwell (Lithospernum arvense L.) *Salfern Stoneseed.* An annual or biennial plant naturalized from Europe. It is a weed of our fields east of the Mississippi river, grows 6 to 20 inches high, and has small white flowers. The seeds are brown, wrinkled and pitted, with two flat sides showing that four seeds are clustered about the pistil of the flower. The seeds in very small quantity were found in but one sample (No. 94), of Crimson Clover. The Gromwell seed is much larger than that of Crimson Clover, and hence can be easily removed.

Curled Dock (Rumex crispus L.) This troublesome weed was introduced from Europe and now occurs throughout the United States. The seeds occur very commonly as an impurity in farm seeds. The seed of Curled Dock may be recognized as a triangular seed about the size of Red Clover seed, and of a beautiful, glossy, nutbrown color. It was generally present in the Orchard Grass, Kentucky Blue Grass, Alsike and Red Clover.

Finger Grass (Syntherisma sanguinalis (L.) Nash.) *Large Crab Grass* This common weedy grass, brought to us from Europe, is found in all cultivated regions. The seed was present in only three samples of Red Clover and one of Millet. It was in inexcusable abundance in the Millet.

Flax (Linum usitatissimum L.) *Linseed.* Flax often escapes from cultivation and lingers about as a weed. The flat shining seeds are well known to farmers and when present among grasses or clovers may be easily distinguished. They were only very rarely present in the samples examined.

Green Foxtail Grass (Ixophorus viridis (L.) Nash.) This annual grass and its companion the Yellow Foxtail Grass are well known to every person who has entered a corn field in the fall. They came to this country from Europe many years ago and found that our climate in all parts of the United States was favorable to their growth. The seed is often present in farm seeds and every farmer should have in a small vial a sample of the cured seed of this and indeed of all the obnoxious weeds of his farm, and thus be aided in determining the impurities of the seeds he uses. Green Foxtail Grass seed was most frequently present in the samples of Red Clovers, but occasionally also in Crimson Clover and Timothy.

Heal-all (Prunella vulgaris L.) *Self-Heal.* This pernicious little weed is a member of the Mint family of plants, has a square stem, opposite leaves, and a terminal spike of purple flowers. In the lawn it persists in holding on, spreading and killing out the Blue Grass. In the fields it is no blessing, though less of a curse than upon the lawn. The seeds are about the size of Red Clover seed, with the shape of a Castor Oil bean, and a nut brown color. They were present only in a few samples of Red Clover; in one case, over 6,000 seeds to the pound of sample.

Lady's Thumb. (Polygonum Persicaria L.) This is another European weed that has become common over the United States. It is an annual that may be kept in subjection by cultivation where the cultivator and hoe can be used. The seeds are about the size of Crimson Clover seed, somewhat flattened, with a shining, ebony black color. This impurity occurs very generally in the Clovers and occasionally in Timothy and Blue Grass.

Lamb's Quarters (Chenopodium album L.) *White Goose-foot. Pigweed.* This common weed of our fields and gardens is very well known, still but few persons are likely to recognize its seed when it occurs as an impurity. A specimen of the ripened seed is easily obtained and cleaned for reference and should be preserved for that purpose by farmers and merchants who handle farm seeds. Seeds of this weed were most commonly present in Timothy, though frequently found also in Blue Grass and the Clovers.

Meadow Fescue Grass (Festuca elatior L.) This grass is cultivated for fodder, but is widely distributed as a weed of the field east of the Mississippi river. It is likely to be present in grass seeds which resemble the seed of this Fescue, as in the case of Orchard Grass. It was occasionally found in Blue Grass and Red Clover.

Parsnip (Pastinaca sativa L.) This plant is a weed that is frequently seen in neglected fence rows, escaped from cultivation. The large flat seeds easily recognized were strangely present in a sample of Timothy, from which it could have easily been removed.

Pursh's Plantain (Plantago Purshii R. & S.) This is a weed of plains and prairies west of the Mississippi river that no doubt will soon be, if not already, found in the east. The seed is boat-shaped and closely resembles the seed of the Ribgrass or Buckhorn (P lanceolata) of our eastern fields. It is, however, larger and of a lighter brown color, being almost white on the concave side. This seed was present in a few samples each of the Orchard Grass, Blue Grass and Red Clovers.

Ragweed (Ambrosia artemisiaefolia L.) No weed is more common in our neglected fields than this Ragweed. We cannot refer it to Europe except as it has been introduced there from our country. Farmers are well acquainted with its character and the appearance of the seed. It is seldom present in properly cleaned seed; in fact, it was found in but one out of 250 samples of seeds.

Rib-grass (Plantago lanceolata L.) *Buckhorn, English Plantain.* This troublesome weed is another representative of Europe with a reputation. It is probably all over the United States. The seed is shining brown, boat-shaped, about the size of Crimson Clover seed. It was the most frequently present of all the weed seeds in the clover and occasionally in the grasses. In some samples it occurred in large quantities, as is shown in the appropriate tables.

Rugel's Plantain (Plantago Rugelii Dec.) This plantain resembles our common Plantain (P. major L.) The seed is black with a light colored spot on the flat side. It might easily be mistaken for mouse dirt in Clover seed unless one should use a magnifying glass. This was most frequently an impurity of the Timothy seed and often as many as 2,000 to 3,000 seeds to the pound of sample.

Rye Grass (Lolium perenne L.) This grass weed of cultivated grounds is widely spread in this country but is a native of the Old World. Its seeds are seldom present in the ordinary farm seeds. Among all the samples submitted for examination it was contained in but two of them, these being of Blue Grass, and then only in small quantities.

Sedge (Carex sp.) Several Sedges are weeds in wet lands, and may often be found occupying wet spots in meadows, from which they do not go very far astray. The seeds are usually triangular or flat. A species of Carex having a flat brown seed was present in nearly all the samples of Blue Grass, but in no case among other kinds of seeds.

Sheep Sorrel (Rumex acetosella L.) A common and persistent weed known everywhere. Though quite small it grows and thrives along with any crop that may be planted. It loves particularly sour and sterile land. The seed when it occurs as an impurity of farm seeds may have two appearances, one the shining brown, triangular form common to Rumex, and the other with a dull brown reticulated surface due to the covering which the seed usually retains. This seed is very generally present in farm seed. It is so much like Alsike in general appearance that it is difficult to separate the two thoroughly, consequently we find it as a serious adulterant of Alsike.

Spotted Spurge. (Euphorbia nutans Lag.) This Spurge is seen commonly in thickets and cornfields but may be found in some places among the clover. It is an annual that gives but little annoyance as a weed. The very small globular seeds are seldom present in well cleaned seeds. They were found only in three samples of Red Clover.

Timothy (Phleum pratense L.) Timothy seed occurred as an impurity in all kinds of farm seeds examined in greater or less quantities. It was most abundant and at the same time most serious in the Kentucky Blue Grass and Alsike. In one sample of the latter over 90,000 were estimated to a pound of sample.

Tumble-weed (Amaranthus graecizans L.) This weed is common over the United States. Its popular name is well deserved, for the tumbling about of this weed with the winds of fall and winter is observed everywhere. The seeds are small, shining black bodies about the size of White Clover seed, and are very likely to occur as impurities in any of the clovers.

White Vervain (Verbena urticifolia L.) *Nettle leaved Vervain.* A common weed in waste places. It is best removed from farm seeds by cutting out the plants before the crop is harvested. The seeds are as long as Crimson Clover seed, but very slender, and light brown in color. It is most likely to occur in Timothy and Millets.

Wild Peppergrass (Lepidium Virginicum L.) This native weed occurs in our fields and meadows, and, like in the preceding case, its seeds could be most cheaply excluded from farm seeds by cutting out the weeds from the fields before the crop is harvested. The seeds were present in small quantities only in the grass examined —Timothy, Orchard Grass and Kentucky Blue Grass.

Willow-leaved Dock (Rumex salicifolius Weinm). *White Dock.* This native Dock is generally in swampy land. It grows from one to three feet high and is quite distinct from other Docks in having very narrow leaves. The seeds are brown and triangular when separated from the broad-winged covers of the flowers. They were present in samples of clovers, particularly, the Mammoth Red Clover.

Witch Grass (Panicum capillare L.) *Tumble-weed.* Dried plants of this grass roll about in the wind after the fashion of the Amaranth Tumble-weed and is often found with the latter and is also known as a Tumble-weed. The seeds are produced in abundance, but were found in comparatively few samples of farm seeds, mostly Red Clovers.

Yellow Foxtail Grass (Ixophorus glauca (L.) Nash.) *Pigeon Grass.* This grass weed is recognized as the companion of the Green Foxtail, found in cultivated fields. It is the larger and coarser of the two in every way, even the seeds are decidedly larger. For this reason, no doubt, they occurred less frequently as impurities in the Clover seeds.

CONCLUSIONS.

Viewing the question of the seed supply in Pennsylvania from the facts learned by this investigation, we may conclude that there are farm seeds placed on sale that are exceedingly poor and even worthless. Since the samples were drawn from about 55 stores and these were located principally in the cities and larger towns, it is reasonable to believe that the worst conditions of this problem have not been touched, for a dealer with an extensive trade is always more discriminating in making the purchases for his own supply than one having but an occasional call for a particular line of goods. Nevertheless, unscrupulous dealers may be located in large as well as small towns, and the farmer, when making the purchase of his seeds, should insist upon knowing more about the quality of the seeds offered than can be learned from its appearance and price. The dull appearance common to old seed is not readily observed, unless samples of fresh seeds of the same kinds are near at hand for comparison, and the prices of seeds, as shown by the preceding tables, are no index of their true agricultural value. A sample of Red Clover at $6.50 per bushel has an agricultural value of 74.9 per cent.; another at $4.75 per bushel has an agricultural value of 90.8 per cent.; and again one at $6.00 per bushel has an agricultural value of 96.5 per cent., while another at $5.00 per bushel has an agricultural value of 22.6 per cent., and thus it is for all kinds of seeds.

No farmer can judge of the true value of a given sample of seed by its appearance and price any more than he can judge the quality of a fertilizer from similar data. The true index of the latter to the farmer is in the chemical analysis placed upon the bag containing the fertilizer, and so the true index of the agricultural value of a sample of seed can only be in a statement of the per cent. of pure germinable seed contained in it. With such a statement he can judge if the price attached is cheap or dear and he can determine whether he should plant the seeds thickly or thinly upon his farm. The large seed houses determine such facts for themselves to protect their own reputations for supplying only reliable seeds, and if farmers would always insist upon having such a statement when buying a quantity of seed, it would soon become the custom to have with every shipment of seeds in bulk the per cent. of pure germinable seed. The farmer will then be able to choose intelligently between two samples of Red Clover, for example, like sample No. 50 and No. 102. The former has 74.1 per cent. pure germinable seed, at $6.25 per bushel; the latter has 94.3 per cent. pure germinable seed, at $6.60 per bushel. The calculation shows that for good seed the latter article is cheaper per bushel by $1.43; and the further analysis of the samples shows 2,500 weed seeds (principally Ribgrass or Narrow-leaved Plantain), to the pound in No. 50, and only 15 (Green Foxtail), in No. 102. It is very clear, therefore, that the higher priced article is the cheaper seed to buy.

It has long been known that poor seeds have been sold to farmers, and many attempts have been made to prevent such frauds. If a law can be enacted by the Legislature of Pennsylvania, one that is not too cumbersome to the seed dealers who aim to do an honest business regularly, and that will prevent the sale of inferior seeds, our farmers would experience a large measure of relief from the present impositions.

Such a law should require every seed producer or dealer to affix to every package or bulk of grasses, clovers and other forage plants, commonly known as agricultural seeds, sold in quantities of one pound and upwards, a guarantee stating the percentage of purity and of vitality. Such guarantee should, as a matter of protection to both producer and consumer, be required to be dated, and a reasonable limit of time should be fixed by the law at which the liability of the guarantor should terminate. All guarantees should be made to expire with the planting of the seed or 60 days after their purchase by the consumer. Seeds of vegetables, flowers, shrubs and trees might well be exempt from the action of this law, because fraud in the sale of them is seldom perpetrated, and when it is, the nature of it is such that it cannot be detected in the seed. All such seeds, however, as well as those sold in quantities of less than one pound should be required to be marked with the year of their growth. The purchaser of seeds is entitled to know these facts about the seeds he buys, and the honest seedsman should not refuse to give them. Proper penalties should of course be provided for failure to comply with the law or for false guarantees. In Pennsylvania, the enforcement of the law would naturally be placed in the hands of the Secretary of Agriculture, who should be authorized to secure and examine samples and publish the results substantially as in the case of commercial fertilizers and to proceed against violators of the law.

The effect of such a law will be, if properly enforced, to drive out of the market inferior seeds, therefore greater care will be exercised in the cleaning of seeds and the farmers must expect to pay a higher price for his seeds. However, the statistics given in this Bulletin show that often the higher-priced seeds are the cheaper to the farmers.

APPENDIX.

The laws enacted or under consideration in other States are appended to indicate the efforts being put forth to regulate the sale of agricultural seeds.

The law printed below was enacted in 1897 by the Maine Legislature.

AN ACT TO REGULATE THE SALE OF AGRICULTURAL SEEDS.

Section 1. Every lot of seeds of agricultural plants, whether in bulk or in package, containing one pound or more, and including the seeds of cereals (except sweet corn), grasses, forage plants, vegetables, and garden plants, but not including those of trees, shrubs and ornamental plants, which is sold, offered or exposed for sale for seed by any person or persons in Maine, shall be accompanied by a written or printed guarantee of its percentage of purity, freedom from foreign matter: Provided, That mixtures may be sold as such when the percentages of the various constituents are stated.

Section 2. Dealers may base their guarantees upon tests conducted by themselves, their agents, or by the Director of the Maine Agricultural Experiment Station: Provided, That such tests shall be made under such conditions as the said Director may prescribe.

Section 3. The results of all tests of seeds made by said Director shall be published by him in the bulletins or reports of the Experiment Station, together with the names of the person or persons from whom the samples of seeds were obtained. The said director shall also publish equitable standards of purity together with such other information concerning agricultural seeds as may be of public benefit.

Section 4. Any person or persons who shall sell, offer or expose for sale or for distribution in this State agricultural seeds without complying with the requirements of sections one and two of this act, shall, on conviction in a court of competent jurisdiction, be fined not to exceed one hundred dollars for the first offense, and not to exceed two hundred dollars for each subsequent offense.

Section 5. Any person or persons who shall, with intention to deceive, wrongly mark or label any package or bag containing garden or vegetable seeds or any other agricultural seeds, not including those of trees, shrubs, and ornamental plants, shall be guilty of a misdemeanor and upon conviction in a court of competent jurisdiction shall be fined not to exceed one hundred dollars for the first offense and not to exceed two hundred dollars for each subsequent offense.

Section 6. The provisions of this act shall not apply to any person or persons growing or selling cereals and other seeds for food.

Section 7. Whenever the Director of the Maine Agricultural Experiment Station becomes cognizant of the violation of any of the provisions of this act, he shall report such violation to the Secre- of the Board of Agriculture, and said Secretary shall prosecute the party or parties thus reported.

Section 8. All acts and parts of acts inconsistent with this act are hereby repealed.

Section 9. This act shall take effect September one, eighteen hundred ninety-seven.

A BILL ENTITLED AN ACT TO REGULATE THE SALE OF AGRICULTURAL SEEDS IN THE STATE OF MARYLAND, PROVIDE FOR THEIR INSPECTION, AND TO APPROPRIATE A SUM OF MONEY THEREFOR.

Section 1. Be it enacted by the General Assembly of Maryland that every lot of the seeds of agricultural plants of one pound or more, whether in bulk or in package, and including the seeds of cereals, grasses, clovers and other forage plants, but not including the seeds of vegetables, flowers, trees, and ornamental shrubs, which are sold or offered for sale in the State of Maryland, for seed purposes, shall be accompanied by a written or printed statement of the percentage of purity (freedom from foreign matter), the percentage of germinable seed, and a statement as to the presence or absence of the seeds of dodder (Cuscuta), Canada thistle, (Carduus arvensis), and the bulblets of wild onions (Allium vineale).

Section 2. Be it enacted that all packages of seeds of any kind, sold for seed purposes, and in packages of less than one pound and all vegetable seeds in packages of one pound or more, shall be plainly marked with the year in which they were placed on the market.

Section 3. And be it enacted that the Maryland Agricultural College is hereby authorized and directed to receive from any resident of the State of Maryland, not a dealer in seeds, samples of seeds as above specified, purchased by him for actual use, together with the dealer's statement accompanying the same, and to make tests of such samples; and the Maryland Agricultural College, or its duly authorized agent, is hereby authorized to prescribe the rules and regulations under which these samples shall be received and tested.

Section 4. And be it enacted that if the official test of any sample falls more than two per cent. in purity, or ten per cent. in germination below that indicated in the dealer's statement, the dealer shall either take back the seed and refund the purchase price, paying all charges, or shall refund a pro rata amount of the purchase price, as the buyer may elect, but no claim against the dealer shall be valid if presented after the seed is planted, or more than two months after the sale of the seed.

Section 5. And be it enacted that the Maryland Agricultural College or its representatives, is hereby authorized to secure for test, by purchase at the market price, if necessary, samples of any lot or lots of seed, as described in section one, sold or offered for sale in the State of Maryland, together with the dealers' written or printed statements concerning the quality of such seeds, and to publish annually all tests made at the College, together with the names of the dealers and their statements of quality.

Section 6. And be it enacted that any seedsman or dealer, offering seeds for sale in the State of Maryland after July first nineteen hundred, not in compliance with sections one and two of this act, or failing to comply with the requirements of section four of this act, shall be deemed guilty of a misdemeanor, and shall be subject to a fine not to exceed one hundred dollars for the first offense and two hundred dollars for every subsequent offense, on trial and conviction before a justice of the peace, or by indictment in court.

Section 7. Be it enacted that the Treasurer of the State, upon the warrant of the comptroller, be and he is hereby authorized and directed to pay to the Board of Trustees of the Maryland Agricultural College, or their duly bonded officer. one thousand dollars annually, on July the first of each year, to carry out the provisions of this act.

Section 8. And be it enacted that it shall be the duty of all States Attorneys to prosecute all persons accused of violating this act, or any of the provisions of this act.

Section 9. And be it enacted that all acts or parts of acts inconsistent with the provisions of this act, are hereby repealed.

Section 10. And be it enacted that this act shall take effect on July the first nineteen hundred.

This law failed to pass in the Legislature of Maryland because of opposition from seed dealers' associations. A similar law in Minnesota likewise failed in the Legislature of 1900.

DRAFT OF LAW UNDER CONSIDERATION IN NORTH CAROLINA.

An act to govern the sale of field and garden seeds in North Carolina and to prevent fraud in the sale of such seeds.

The General Assembly of North Carolina do enact:

Section 1. That the State Board of Agriculture shall at the regular meeting next after the ratification of this act, adopt and publish rules and regulations for governing the sale of field and garden seeds in this State. Such rules and regulations shall not conflict with the Constitution of this State, or of the United States. They may be modified, extended or otherwise changed at any subsequent regular meeting of the Board.

Section 2. That the Board of Agriculture shall publish such rules and regulations in the official Bulletin and such State newspapers as they elect. The Board shall give thirty days' notice before such rules become operative. Such rules, when officially published shall have the effect and authority of law.

Section 3. That the Board shall provide a duly qualified expert and all necessary apparatus for testing seeds and shall set apart room for such work in the Department building. The Board shall prescribe the method for determining the purity, viability and cultural worth of seeds; said method shall be that recommended by the Association of American Agricultural Experiment Stations and Colleges, with such modifications as the Board shall from time to time adopt.

Section 4. That the Board of Agriculture shall publish a minimum of quality or cultural worth for each variety of field and garden seeds commonly sold in this State. No sample of seeds falling below the specified minimum shall be permitted to be sold for planting in the State. The Board shall cause samples of field and garden seeds to be collected in the markets of the State from time to time. Any seeds offered for sale and falling below the prescribed minimum, or which are untrue to name, shall be seized and destroyed without recompense to the owner. The person, firm or corporation offering such infra-minimum seeds shall be guilty of a misdemeanor as prescribed in section 9 of this act. But nothing in this act shall be construed to prevent the sale of any grade of seeds as grain or for any purpose other than planting or propagation.

Section 5. That no person, firm or corporation shall sell field or garden seeds for planting in this State without a license from this Board of Agriculture. The Board of Agriculture shall issue a license to deal in field and garden seeds to any applicant of good character having a permanent and localized domicile in this State, upon application, complying with the rules and regulations of the board governing the sale of seeds. No charge shall be made for such license. The period for continuance of license shall be determined by the board.

Section 6. Every person, firm or corporation licensed to deal in field and garden in this State shall be entitled to have 25 samples of seeds analyzed and certified by the expert of the Board of Agriculture free of charge. Additional samples shall be charged for at cost of doing the work.

Section 7. Every *bona fide* purchaser of seeds for planting, a resident of this State, shall be entitled to have as many samples of seeds examined and certified by the expert of the Board of Agriculture as he desires, free of charge, provided, such are intended for planting by the person sending the samples or by his tenants, and the samples are taken and described as required by the rules of the Board of Agriculture.

Section 8. That the board shall prescribe the form of guarantee of labels and certificates to be attached to packages of seeds exposed for sale in this State and may supply licensed dealers with official labels at net cost of the same.

Section 9. Every unlicensed person, firm or corporation offering for sale field or garden seeds for planting in this State; every person, firm or corporation offering seeds fraudulently labeled or misbranded or below the minimum prescribed by the board for such seeds; and every person, firm or corporation violating any of the rules and regulations of the Board of Agriculture for governing the sale of seeds, shall be guilty of a misdemeanor and upon conviction shall be fined not less than $5.00 nor more than $50.00 for each offense. Such persons, firms or corporations shall also upon conviction forfeit the license they may have from the board and the board may refuse to reissue such license. But nothing in this act shall be construed to prevent any person without license from dealing in seeds as grain for other use than planting, or from selling seeds of his own growth to dealers. All fines recovered under this act shall be paid into the treasury department of the State Department of Agriculture.

Section 10. That it shall be the duty of every solicitor to whom the Commissioner of Agriculture shall report any violation of this act, to cause the persons, firms or corporations violating to be prosecuted as provided in this act.

Rules and Regulations for Governing the Sale of Field and Garden Seeds for Planting in North Carolina.

1. No person, firm or corporation shall advertise or offer for sale, barter or gift in this State any variety of field or garden seed for planting unless a license to deal in such seeds has been procured from the State Commissioner of Agriculture. But any person may without license sell or otherwise dispose of field or garden seeds grown by himself or upon his own land to any dealer in seeds.

2. Seeds intended for used other than planting may be sold by any one without license or certification.

3. A license to deal in field and garden seeds will be issued free of charge by the Commissioner of Agriculture to any reputable person having a permanent residence and place of business in this State, provided the applicant agrees to guarantee his seeds according to the method described in rules 11 and 14 following.

4. Every sample and variety of field and garden seed offered for sale in this State shall have attached a label of the form issued by the Commissioner of Agriculture. Said label shall contain the true botanical and common names of the seed and the per cent. of viable seeds and of foreign seeds in the sample and the true and cultural worth of the sample. The determination of genuineness, purity and viability shall be according to the laboratory method adopted by the State Board of Agriculture. See Rule 14.

5. Seeds kept in stock but not on sale need not be labeled. When a large stock is kept and only a small sample or lot is exposed for sale one label may serve for successive portions taken from the stock bin during a period of three months provided the original lot was certified.

6. Where a mixture of seeds is offered, the true name of each ingredient and its per cent. of the whole must be stated on label, together with the per cent. of the viable seeds of each variety. The Commissioner does not recommend the keeping of mixed seeds in stock since different varieties of seeds deteriorate with different rapidity.

7. No variety of field garden seeds for planting shall be offered for sale in this State if the same shall fall below the following minimum of viability when tested by the official method, to wit:

(See N. C. Agr. Exp. Sta. Bulletin 108, pp. 383, *et seq.*)

8. No sample of wheat, oats, barley or rye for planting shall be offered for sale in this State unless the same has been treated for smut and ergot according to the method adopted by the board. See rule 15.

9. No sample of clover, lucerne or vetch for planting shall be offered for sale in this State if the same shall contain more than 1 per mille of fodder.

10. Every person, firm or corporation to deal in field or garden seeds in this State may send to the Department for analyses and certification each year 25 samples without charge. Additional samples will be charged for at following rate:

For a full test of purity and viability,	50c.
For a report as to viability,	25c.
For report as to purity,	25c.
For report as to genuineness,	25c.

Official labels will be supplied at net cost of printing and paper.

11. With every variety and lot of seed sold to a planter the seller shall give the following certificate and guarantee with blanks duly filled up, to wit: This certifies that .... has this .... day of ...., 190.., bought of undersigned .... lbs. of .... seed, botanical name of which is .... The undersigned guarantees that this sample of seed contains not more than ..... per cent. of foreign matter and that it will germinate by the official method ...... per cent. If a cereal, that the seed has been treated for smut or ergot according to the method prescribed by the Commissioner of Agriculture. If the Commissioner of Agriculture reports more than 19 per cent. of foreign matter above this guarantee, or a viability falling more than ..... per cent. below

this guarantee, the undersigned agrees to receive back the seeds and pay the cost of carriage both ways, or to refund a proportionate part of the purchase price at purchaser's option. Provided, the seed is returned or started back within 30 days from but not including date of sale, and further, that no more of the seed is lacking than is required by the State Department of Agriculture, for making a test of this variety.

This guarantee expires also as soon as the seeds are sown.

Signed, ... Address, ...

12. Purchasers of seeds who wish samples tested to verify seller's guarantee must take the sample according to a particular method and fill out a special blank which will be furnished free of cost on application to the Commissioner of Agriculture. Samples not taken by the official method will not be received or tested.

(See sampling blank, circular 34, O. E. S.)

13. Any seed dealer in this State violating these rules will have his license revoked and will be prosecuted to the full extent of the law.

14. All determinations of seed quality under these rules shall be made according to the method recommended by the Association of American Agricultural Experiment Stations and Colleges. (See circular 34 O. E. S.)

15. Cereal seeds for planting must have been tested, before exposing for sale, with copper sulphate, potassium sulphide or formalin.